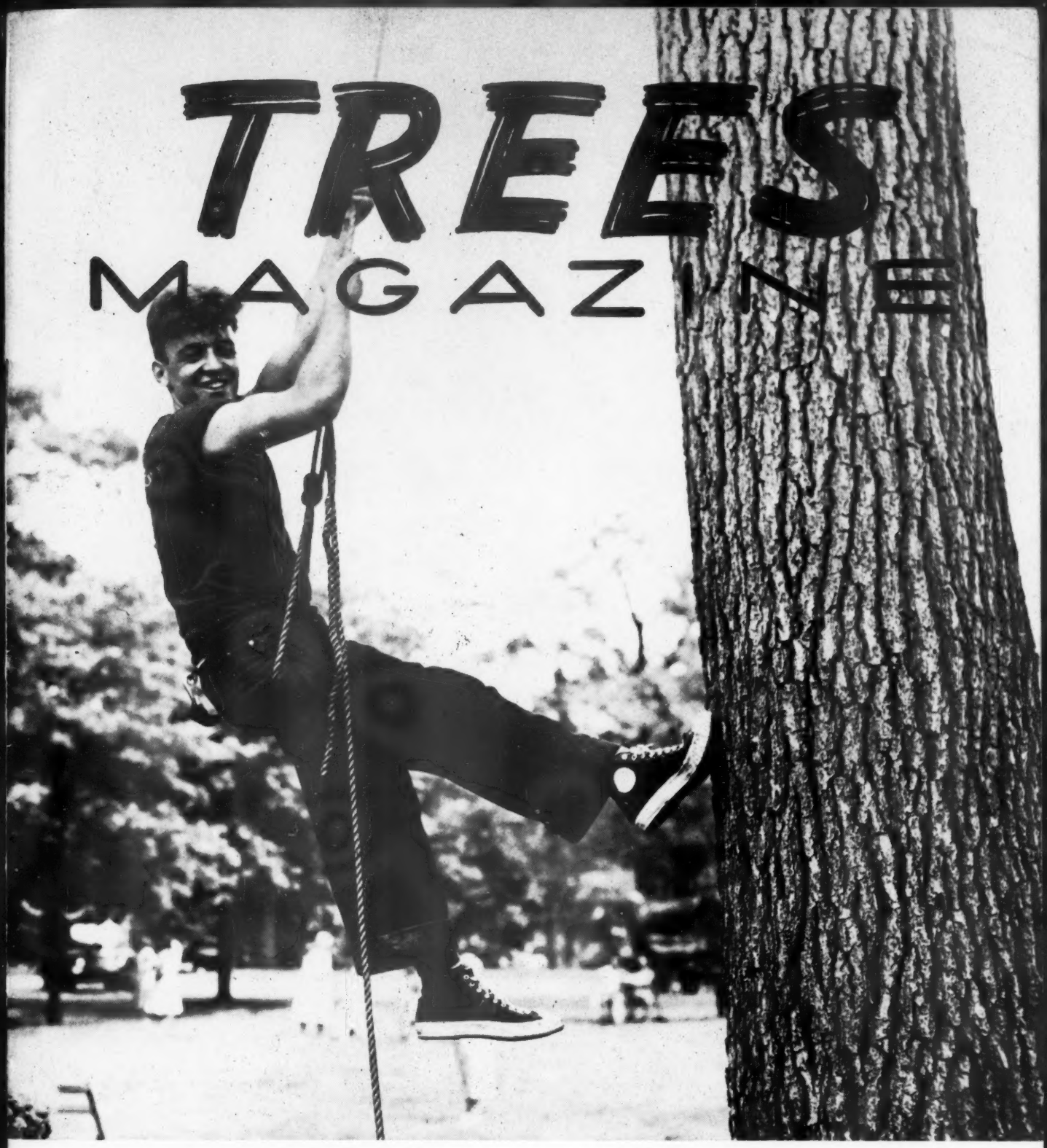
TREES MAGAZINE



Ronald Mandeville, Bridgeport, Conn., America's Tree Climbing Champ.

A Merry Xmas and a Happy New Year to All Our Friends

Gas Injury To Trees (Part One) — *David H. Marsden*

Personalities In Arboriculture — *Edward A. Connell*

November - December, 1950 *The Journal of American Arboriculture* Vol. 11—No. 1

You can't beat McCulloch Chain Saws

on the ground or in a tree

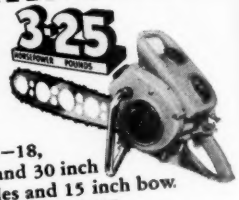
Clearing a right-of-way through mountainous, heavily wooded country involves almost every kind of sawing—topping, pruning, felling, and bucking. The large utility doing the work shown here is using light-weight McCulloch's for the entire job.

The 5-hp, 49-lb. McCulloch makes quick work of big trees. Its light weight saves time between trees in these hills.

The McCulloch 5-49 is shown here with blade swiveled to bucking position; the 3-25 in the background is limbing.

5-49—20, 30, 40, 50 and 60 inch blades and 20 inch bow. Priced from $385

A McCulloch 3-25 dropped this tree in less than a minute, has plenty of power to fell or buck trees 3 or 4 feet thick.



3-25—18, 24, and 30 inch blades and 15 inch bow. Priced from $295

All prices f. o. b. Los Angeles

The 3-hp McCulloch 3-25 handles easily up in a tree because it weighs only 25 lb., and saws at full power in any position.

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TREES Magazine is a bi-monthly Journal published at Cleveland, Ohio, by Edward H. Scanlon, and is devoted to the furtherance of the technical and business administration of Trees (Street and Ornamental); Parks (Municipal and National); and Forests (State, National and Private), in the U. S. Scanlon Publishing Co., P. O. Box 5607, Cleveland, Ohio. Subscription by mail $2 per year; outside United States, $2.50. Advertising rates upon inquiry. Closing date for advertising copy—10th of month preceding date of issue. Unsolicited manuscripts must be accompanied by return postage.

ALONG THE WAY With . . . EDW. SCANLON

■ After, OH SO MANY YEARS, I finally CUT ACROSS THE TRAIL of PAUL GRUENDYKE again. PAUL has just been appointed DIRECTOR OF PARKS AND RECREATION for LOS ANGELES COUNTY, and was in CLEVELAND at a RECREATION CONFERENCE. PAUL and I were on SEVERAL OF THE COMMITTEES formed in the EARLY DAYS of the WESTERN SHADE TREE CONFERENCE. He'll DO WELL in his new job—GOOD BOY.

■ *An INTERESTING TOUCH has been added to WESTERN SHADE TREE CONFERENCE literature. My original slogan "A NEW ERA IN TREE CULTURE FOR THE WEST" has been augmented with "FROM MEXICO TO THE YUKON." This BRINGS BACK MEMORIES of the banquet, THE NIGHT OF THE FIRST CONFERENCE, in SANTA MONICA, when we had TO FIGHT OFF a DETERMINED EFFORT to ADOPT as a name "THE LOS ANGELES SHADE TREE CONFERENCE." WOULDN'T THAT have given it SOME SCOPE!*

■ ALL who knew CLARENCE SIEBENTHALER were PROFOUNDLY SHOCKED to learn of HIS SUDDEN DEATH several weeks ago in NEW YORK. CLARENCE hadn't been well but he had to STAY IN THE SADDLE, and was attending a NURSERY ASSOCIATION committee meeting WHEN HE WAS STRICKEN. CLARENCE WILL BE MISSED by the industry WHICH HE SERVED so COURAGEOUSLY and EFFICIENTLY.

■ *The GENERAL OPINION AROUND these parts, BASEBALL PARTS that is, is that LOU BOUDREAU got a LOUSY DEAL. Thems MY SENTIMENTS too. He and BOB FELLER gave this town ITS ONLY BASEBALL THRILLS for QUITE A FEW years—THEN BINGO.*

■ It is INTERESTING TO LEARN that a WEST COAST UTILITY has FINALLY SEEN THE LIGHT and is issuing A BROCHURE on the eternal question — TREES VS. WIRES—on the sound basis of HOW TO USE TREES PROPERLY, and what trees TO USE (their list is AWFULLY WEAK and INADEQUATELY SMALL). Let's hope THEY DON'T FORGET the other HALF of the formula HOW TO INSTALL POLES AND WIRES PROPERLY. These two brochures should be PUBLISHED SIMULTANEOUSLY.

■ *HERE'S SOMETHING that HAS ME WORRIED. No fooling, THIS HAS GONE ON for a long time with NOT A WORD from any of my SPECIAL AGENTS and I'm really A 'WORRYING' MAMMY. I must have THE LOCATION of a FINE MATURE, or large, specimen of RED LEAVED WEEPING BEECH. There is SUCH A THING somewhere in the east, SO BOYS, GIVE. I want to get a LARGE KODACHROME, also a 35 M.M. The SUCCESSFUL RANGER will receive a large jar of SKIPPY PEANUT BUTTER.*

■ Every NEW BOOK that comes out ON TREES seems to be A REHASH of dozens of NATIVE SPECIES that have NO ORNAMENTAL value, and VERY LITTLE COMMERCIAL VALUE. So yours truly HEREBY LAUNCHES the beginning of AN EFFORT to produce A BOOK to be titled "EXOTIC TREES IN AMERICA." Not all of them of course, but the MOST IMPORTANT HORTICULTURALLY. We hope we CAN ENLIST some help in the COLLECTION OF PICTURES and BACKGROUND on the many outstanding and BEAUTIFUL TREE IMMIGRANTS to these shores.

■ *WALT MORROW, President of the NATIONAL ARBORIST ASSOCIATION was one who LIKED THE EDITORIAL in the last issue. WALT SAYS: "Your editorial in the last issue of TREES is, to my way of thinking, the finest that you have ever done."*

■ AT LAST the burden of "MORTGAGE MANOR" has passed to THE SHOULDERS of another INTEREST SLAVE. The new abode for the LORD AND LADY is 43 acre "RANCHO COSTA PLENTA" and I'm not kidding—at OLMSTED FALLS, just WEST OF CLEVELAND on LEWIS RD. you're welcome.

■ *SOME DAYS you ought TO STAY IN BED. We made a SERIOUS TACTICAL mistake in READING PROOF on DR. RANKINS fine article on DUTCH ELM DISEASE last issue on PAGE 22, in the LAST SENTENCE, we had the word "SPRAYING" where it should have read "SAVING."—Thus it SHOULD READ — "Any city or village can obtain the same results if the local interest is directed at saving money by SAVING elms." THANKS to DON WELCH and JOHN MATTHYSE of CORNELL for calling THIS ONE.*

■ Had a VERY PLEASANT day's vsit with JOHN SIEBENTHALER here in November. The DAYTON NURSERY IMPRESARIO got a LONG LOOK at our NEW STREET PLANTINGS of GLOBE ELM, Texas Oak, PAULS HAWTHORN, Globe locusts, WHEATLEY ELMS, Uprite Norways and, of all things MORAINE LOCUSTS.

■ *We had LOOKED FORWARD to a visit THIS MONTH with JOHN CREECH, horticulturist of the U. S. D. A. AT BELTSVILLE, but we learn that a RUSH OF BUSINESS prevents. Make it soon JOHN.*

■ Note THE LETTER from GEORGE BLAIR, CONSUMERS POWER CO., Jackson, Mich., on ANOTHER PAGE. The booklet enclosed WITH GEORGE'S letter is fine—now, SOMEHOW OR OTHER get the utility line designers TO READ IT and PRACTICE it George. THEY DON'T.

■ *I shall BE VERY HAPPY to follow PAUL TILFORDS suggestion in HIS COLUMN, this issue, that GOOD EXAMPLES of LINE CLEARANCE be shown. SEND IN PICTURES.*

■ In case you HADN'T NOTICED this is the BEGINNING of the ELEVENTH VOLUME of TREES. With TWO YEARS out to WIN THE WAR, we're 13 YEARS in the PUBLISHING BIZ. Brother does THAT STUFF called TEMPUS FUGIT.

■ *FRANK KARPICK, ASS'T. CITY FORESTER OF BUFFALO, recently had a SESSION WITH A HOSPITAL. Sorry I could ONLY TALK via phone with you FRANK, when I WAS IN BUFF., but hope the DOC DIDN'T misplace any OF HIS TOOLS.*

■ The Ohio CERTIFIED ARBORIST BILL will GO TO THE POST again. The LEGISLATURE meets in January. DICK BARNHART, PARK SUPER OF AKRON is Chairman of the COMMITTEE. Let's GET BACK OF THIS and ALL WORK to put it over—"GEORGE" IS TIRED OF WORKING ALONE.

■ *I wish SOME VISIONARY SOUL, with a POKEFULL OF LETTUCE, would like TO UNDERWRITE the COST OF FOUR COLOR PLATES of outstanding FLOWERING TREES. We'd RUN THEM in TREES—then use them to illustrate "EXOTIC TREES IN AMERICA." Would be something BADLY NEEDED and is something we've WANTED TO DO for years, but, the COST IS TOO HIGH for the EXCHEQUER.*

■ BAD NEWS. Two cases of OAK WILT have been found in LAKEWOOD, OHIO, a suburb of CLEVELAND. One by CHARLIE IRISH and one by the DAVEY CO. This makes FOUR CASES IN OHIO. Lakewood is sovered with PIN, WHITE AND RED OAKS.

■ *We had a TERRIBLE SHOCK when JOHNNY WOODRUFF informed us of the TRAGIC DEATH OF MIKE HARTNEY. MIKE and TWO COMPANIONS were returning from a hunting trip, in MIKE'S PLANE, when they encountered BAD WEATHER over CAPE COD. An intensive SEA AND AIR SEARCH failed to uncover ANY TRACE of the trio. The accident OCCURRED NOV. 17. MIKE'S snappy comebacks WILL BE MISSED at FUTURE CONFERENCES. HE WAS A GOOD IRISHER.*

■ THE COVER PICTURE — The young man on the cover, Ronald Mandeville, 20, of Bridgeport, Conn., won his title as America's Tree Climbing Champion in a contest last summer at the Connecticut Tree Protective Association meeting at New Haven. Ron is employed by the E. J. Fennel & Son Co., Arborists of Bridgeport.

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TREES MAGAZINE
Box 5607, Cleveland 1, Ohio

The Editors of TREES invite discussions, comments and all types of literary materials pertaining to trees and tree preservation from any person engaged either in the scientific advancement or commercial development of the field.

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November-December, 1950 **Journal of the National Arborist Association** Vol. 11—No. 1

EDWARD H. SCANLON, Editor
Box 5607, Cleveland 1, Ohio
Phone ADams 5-2357

"No place is complete without trees. A home without trees is charmless; a road without trees is shadeless; a park without trees is purposeless; *a country without trees is hopeless*"

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Out On A Limb

IS THE ELM DILEMMA A CATASTROPHE

It has been said that "every cloud has a silver lining," which is quite an all-inclusive statement. If it is true, and we have never seen or heard evidence to the contrary, then the plight of the American elm, in fact all good species of elm, may not be the overall catastrophe that many people are inclined to believe.

We are going to lose many more thousand and tens of thousands of elms from the two-headed scourge, Dutch elm disease and phloem necrosis. No doubt about it. It is spreading, and present control methods, except possibly in one or two very small centers, have proven grossly inadequate and inept. It is possible to protect an undivided or comparatively small group of elms by spraying and sanitation. But, beyond that what about the vast wild areas, the large portions of cities where people are unable to afford spraying. What about the small communities where they have no organized means of combatting the disorders, and of those who ignore it. In our opinion, it all adds up to biological control. However that is not the point we hope to make in this essay.

In every city, town and hamlet in the nation the American elm, because of its rapid growth and high transplanting factor, in addition, of course, to its unparalleled beauty, has been unwisely overplanted. Most mature and maturing elms have been placed where the aerial and ground space were insufficient for its heavy demands. The results have not been pretty. Huge maintenance problems have resulted and where people might have been educated to appreciate trees for the invaluable service they render to city livers, the reverse is true, they dislike these out-of-place giants for the trouble they cause. That they cause trouble there is no question. Disrupted sidewalks; obstructed sewers; roofs and siding marred and dislodged by rubbing branches; interference with street lights and wires, and other disorders that make people tree conscious in a negative way have all led to a general decline in the appreciation of the elm, and of course other trees that have been used indiscriminately. The elm is not the only offender but is the most widely used, so it bears the brunt of the abuse.

Finally we get to the point, which is, with all the ills that have befallen the elm, particularly the American, people have become very dubious as to the wisdom of its further use. This is reasonable and sound. The Dutch elm disease is spreading rapidly, has just been reported in the Detroit area, and no sound economical control is in sight. Even a person with a broad outlook on such matters must hesitate before he invests in elm trees for streets, parks, cemeteries or home grounds use. Therefore we are faced with the question of what to use. Certainly we are not going to find another tree with the unmatched vase form of the American elm, but for most uses that is relatively unimportant, because, as we stated before the elm is entirely too large for most of the uses to which it has been put.

Now, we hope, a true evaluation of space and use factors

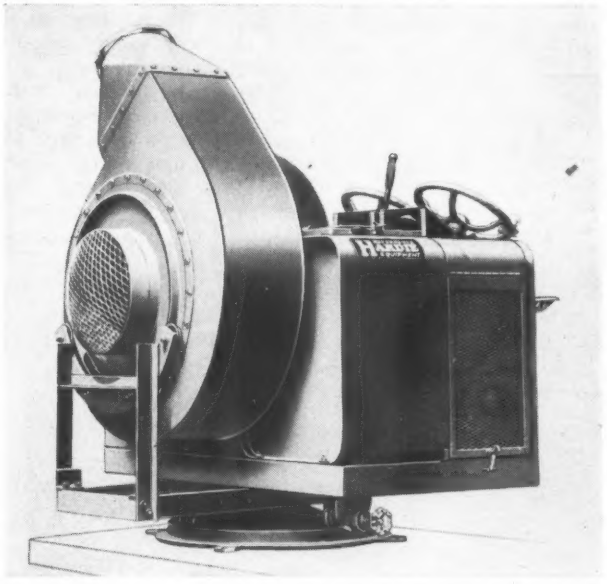
will dominate the selection of a tree as should have always been the rule. The realization that there are hundreds of exotic and native trees that should long ago have been utilized in the planting of our cities, parks and homes, is rapidly becoming apparent to city foresters, arborists, landscape architects, park superintendents and others. The fact that we have available a tree to fit any space requirement has been preached in the pages of TREES Magazine for years, and the demand for different species and forms is increasing rapidly.

We must be much more conscious of future maintenance. There are few cities or institutions today that come even close to doing an adequate maintenance job solely because of the misuse of species. We have sought pyramidal, small and large globes. We have many trees that do not attain heights of over twenty to thirty feet, and what is more important, their trunk growth is correspondingly restrained. This factor in itself is of prime importance, especially on most city tree lawns where such narrow spaces are provided. The presence of low overhead wires, streetlights and shallow building setbacks all call for a careful studied evaluation of the many trees available that will fit, and not exceed the space available. This will tend to bring the maintenance potential down within the ability of most agencies to do a respectable job.

The old days when a majority of street tree planting programs were accomplished, about 95%, thru the use of about five species is gone. It is the studied opinions of this writer that an adequate job of street tree planning cannot be accomplished without having at least 65 or 70 species and varieties to choose from. There have been introduced into this country dozens of wonderful trees that are scattered here and there around the country. Most of the people who know these trees cannot understand why they have been ignored. It is difficult to understand, but no longer can this condition prevail. These trees must be introduced to the public and specifically to the profession.—Are you acquainted with the fifteen or twenty species of small Asiatic maples? They compose a kaleidoscope of form, texture and color that make them priceless tools for the many planting jobs that need much more serious consideration so that truly magnificent results can be obtained, not just mediocre.

The work being done by the Shade Tree Selection Committee of the National Shade Tree Conference is in line with this new trend in tree thinking.

This committee can render a great service to horticulture if people wake up and realize the potentialities of having and using trees that are tailored for the job at hand. If people do wake up then surely the dilemma of the elm will have proved a blessing in spite of the present catastrophe.



The new Hardie Air Blast Mist Sprayer. This machine was first shown at the National Shade Tree Conference last summer in Syracuse. See next issue for details, or write the Hardie Mfg. Co., Hudson, Mich.

Big Volume Features New Air Blast Shade Tree Sprayer

Delivering the concentrate mist spray by an air stream of 10,000 cu. ft. per minute traveling at 125 m.p.h., the new Hardie Concentrate Mist Air Blast Shade Tree Sprayer claims more complete and thorough coverage of the tree than has heretofore been obtained by any pest control method or equipment. Tests of this new Hardie unit were made at the USDA Station at New Haven, Conn., under supervision of Dr. Potts.

Factors contributing to the efficiency of this new Hardie Shade Tree Sprayer are the high pressure that completely atomizes the concentrate spray liquid, the extra large volume and velocity of the air stream and the flexibility of the big unit which permits the operator to deliver the pest control mist readily in any direction. The operator can direct the fan housing with its 12-inch air outlet at any point within a radius of 200 degrees. The entire unit rotates within 360 degrees on its turn table. All controls are right under the hand of the operator.

The unit is powered by a 31 h.p. Engine. A new control valve automatically drains the nozzle and pipe system whenever the sprayer is shut off. The sprayer requires 60" x 60" floor space and weighs 2050 pounds. It is 60" high. It will handle, in concentrate form, any conventional spray material.

Reds Making Trees Grow Twice As Fast, Moscow Radio Says

London—Trees that grow twice as high as usual have been evolved at the Soviet institute of agro-forest amelioration, the Moscow radio said.

New varieties of fast growing poplars, larches, accacias, walnuts and other trees were already being used in planting protective forest belts, the radio added. The new larch reached the height of a two-story building after 14 years and yielded four times more wood than usual.

Scientists are producing rapid growing oaks that will resist drouth, the radio said, and they will be planted on southern steppes.

Harold Wagner our Special Agent in Akron sent in this clipping with the query, "Does Joe get TREES Mag"—Yes, in fact two Russian agencies subscribe.—Ed.

Calendar of Events

New York State School for Arborists, Jan. 15 - 16, Cornell University, Ithaca, N. Y.

* * * *

Ohio Short Course for Arborists, Landscape Gardeners and Nurserymen, Jan. 22-24, Neil House, Columbus, O.

* * * *

Connecticut Tree Protective Association, Jan. 25, Stratfield Hotel. Bridgeport, Conn.

* * * *

Midwestern Chapter, N.S.T.C., Feb. 14-16. LaSalle Hotel, Chicago, Ill.

* * * *

Southern Chapter, N.S.T.C., March 22-23, Palm Beach, Florida.

* * * *

Iowa Nurseryman's Assn., Jan. 12-13, Kirkwood Hotel, Des Moines, Iowa.

Gas Injury To Trees

By David H. Marsden,
Assistant Professor, Shade Tree Laboratories,
University of Massachusetts,
Amherst, Massachusetts.

Contribution No. 783 of the Massachusetts Agricultural Experiment Station, Amherst, Massachusetts.

Injury to trees, shrubs, and other vegetation by so-called illuminating gas leaking into the soil is not a new subject to those interested in the welfare of trees. It is an ever-present problem in many localities, however, and one worthy of periodical discussion as a reminder of this potential threat to valuable shade and ornamental trees on streets and lawns. The increasing use of natural gas, piped from natural gas wells in the Central and Southwestern States to areas where manufactured gas has been used heretofore, may alleviate the damage to vegetation to some extent. Several larger cities in the New England area are at present making plans for a change-over. Natural gas, while toxic to vegetation generally, is not nearly so potent or fast acting as is manufactured gas.

The photograph illustrates part of the irreparable damage to trees that resulted from a gas leak: three large maples dead or dying, one elm dying, and two other fine trees less severely injured. In this particular case, as in many instances where street trees are involved, it was impossible to prevent the gas from taking its full toll though the leak was repaired, and a reasonable attempt to aerate the soil was made, at a time when the very earliest symptoms of injury were apparent on only one of the trees. Indeed, it is always much easier to prevent damage to trees from gas than to repair or alleviate an injury already sustained. For this reason it is important in localities where underground gas distribution systems are present that one be always on the alert for signs and symptoms of gas leaks which can be detected and repaired before serious damage its done. It is not being melodramatic to add that the early discovery of an underground gas leak may save more than trees and shrubs—it may save human lives. Nearly every gas company has its records of unfortunate individuals and families killed or hospitalized by gas finding its way into houses from leaks outside in the ground. This is most likely to occur in winter when the soil is effectively sealed by a frozen crust and the escaping gas cannot easily vent itself to the air.

In order to better train one's self to look for gas leaks one should be somewhat familiar with the nature of gas: its manufacture, distribution, physical and chemical characteristics, and effects on vegetation. One need not, of course, become a gas engineer, but there are a few general facts and principles which can be remembered easily. These are set forth in the following paragraphs.

1. General Considerations of Gas and Gas Distribution Systems

A. *Types of Gas:* Illuminating gas, which would perhaps better be called cooking and heating gas today, is of two general types:

1. *Natural gas* is obtained from wells located chiefly in the Southwest and Midwest with some in Ohio and New York. This "oil gas" comes from the ground in the form of gas ready for use and is carried to distant points of utilization in pipe lines such as the "Big Inch." It is less toxic to plant life than manufactured gas. The analysis of a typical natural gas is as follows (9):

Carbon dioxide	0.1%
Illuminants	1.8%
Oxygen	1.8%
Methane	59.8%
Ethane	30.1%
Nitrogen	6.4%

No ethylene is present. The illuminants are saturated hydrocarbons having three or more carbon atoms.

Another form of natural gas is Liquid Petroleum (L.P.), usually butane or propane. Liquid petroleum, as the name implies, is purchased and stored in the liquid state by gas companies, and vaporized for distribution to the consumers. It is used mostly by smaller companies in smaller towns. The gas is heavier than air and tends to stay down in the soil, hence leaks are difficult to find. It is the least toxic of all illuminating gases to vegetation.

2. *Manufactured gas* is generated by partial combustion of coal or coke treated with water or oil sprays. For the purposes of this discussion "water gas" and "coke-oven gas" may be considered as one. The toxicity of manufactured gas varies according to its composition, which is variable, but generally it is more toxic to plants than the natural gases. The composition of a manufactured gas is as follows:

Photo courtesy Robert L. Coffin

Valuable shade trees killed by that insidious killer — gas.

Carbon dioxide	1.06%
Illuminants	9.6%
Oxygen	1.5%
Nitrogen	6.5%
Carbon monoxide	33.7%
Hydrogen	35.4%
Methane	11.7%

The toxicity of illuminating gas to vegetation will be discussed later.

B. *Gas Distribution Systems:* Knowing where the underground gas pipes are usually located and where leaks are most likely to occur is an invaluable aid in searching for gas leaks. Most of the injuries from gas sustained by trees and shrubs are the result of leaks in the underground piping system through which the gas is carried from the "holder" to the household and industrial consumers. Injury to vegetation by noxious gases escaping directly into the air is not included within the scope of this discussion.

1. *Mains*—The mains are the pipes which carry large volumes of gas under the streets where gas is delivered. These pipes vary from two inches up to 24 inches in diameter and are fitted together with various types of elbows, T's, and crosses to follow the network of streets. "Gates" or valves in the mains are located at strategic points to allow parts of the system to be isolated when necessary. Old systems are likely to have many cast-iron mains with packed joints. The joints come at 4, 8, or 12 foot intervals and, because the packing frequently dries out and becomes loosened, the joints are common points of leakage. It is customary practice now, whenever opportunity permits, to reinforce these joints with more leak-proof mechanical leak clamps.

Newer systems are usually of steel pipes with screwed, welded, or Dresser-coupled joints. These mains are less susceptible to joint leaks.

Mains are usually buried 2 to 6 feet deep, depending on the depth of ground freeze among other things, and as a rule are on the opposite side of the street from the water mains. Because fire hydrants are on the same side as the water mains, one can use these as a means of locating approximately the gas mains.

Leaks in mains may be caused by such things as improper packing of joints, shaking by heavy traffic, frost heaves, settling of the soil, construction work, and corrosion. Pitting of the pipes by electrolysis, which used to be blamed on electric street railways running on steel tracks, is still a common source of trouble. In some localities certain obscure soil characteristics result in pitting by electrolysis which necessitate the frequent replacement of pipes. Unwrapped pipes in salt-saturated soils near the seashore are quick to corrode also.

2. *Services*—A service is a small-diameter pipe which carries the gas from the main into the consumer's house. A service is sometimes provided with a shut-off valve at the street end; the valve is housed in a "curb-box." Services and curb-boxes are fertile territory for small leaks. Service leaks are a particular threat to lawn trees, hedges and foundation plantings, and of course to lawns.

3. *Drips*—"Drips" or drip pots are underground receptacles attached to mains at low points to collect the "drip oil" and water which condenses from the gas. The pots are fitted with a pipe extending to the surface through which the accumulated drip oil is pumped out periodically. Drip boxes will leak if the valves are not tightened properly; furthermore, spilled drip oil is injurious to vegetation. Drip boxes are also an aid in determining the approximate location of the main.

4. *Transmission lines*—Transmission lines are pipes which carry gas from a gas well to an area of consumption, or from one town to another. Where considerable distances are to be traveled, the gas is usually under greater pressure than in the city mains.

5. *Gas pressure*—In most systems where manufactured gas is used the gas is forced through the mains under low pressures, the pressure being equal to that necessary to raise a column of water 5-7 inches against atmospheric pressure. Where much higher pressures are developed, such as with natural gas systems, governors are necessary to reduce this pressure before the gas enters the consumer's residence.

Using the combustible gas Indicator
Photo courtesy Robert L. Coffin

Some inter-city transmission lines are under intermediate pressures of 5 to 15 pounds per square inch or even high pressures up to 90 lbs./sq. in. Long distance transmission lines, such as those carrying natural gas from Texas to the East, are under pressures up to 800 lbs./sq. in. The higher the pressure, the more gas escapes from a given size hole and the more serious the injury to surrounding vegetation may be.

II. *The Toxicity of Gas to Vegetation*

The first public gas street-lighting system was installed in London in 1807. Presumably the problem of gas injury to trees materialzied soon after that date. Today, nearly a century and a half later, no agreement has been reached as to the exact mechanism by which illuminating gas injures or kills vegetation.

However, some attention has been devoted to the more fundamental physiological aspects of gas injury by various researchers in this country and in Europe. Hypotheses have been advanced and a few general conclusions reached as a result of this work. Some of the more pertinent findings will be commented on here.

Several workers (5,7,9) have demonstrated that comparable responses in plants can be induced by exposure to manufactured gas or to ethylene-air mixtures having approximately the same concentrations of ethylene as does a representative manufactured gas. These responses differ according to the concentration of ethylene in the gas or mixture. Extremely low concentrations result in epinasty of the leaf petioles in several plants (5); inhibition of growth, swelling, and horizontal placing of the epicotyl of etiolated sweet peas (9); swelling, coiling, and retarded growth in length of roots, and the formation of tubercles on the roots of *Catalpa* and *Ailanthus* (7); a muscid obstruction of fleshy roots (11); the proliferation of cortical parenchyma causing the larger roots and lower stem to crack open, and the formation of hypertrophied lenticels on the roots (1, 12). This last mentioned hypertrophy of tissues apparently results from a stimulation of the phellogen which forms a mass of loose thin-walled parenchyma cells just beneath the outer bark. The stimulation of meristematic tissues by sub-inhibitory concentrations of gas is in accordance with the same phenomenon observed where other toxic substances are involved. High concentrations of illuminating gas or ethylene-air mixtures, on the other hand, kill rapidly with no symptoms of injury other than death.

That ethylene, and probably illumi-

(Continued on Next Page)

nating gas too, can move through plants was shown by Zimmerman et al. (13). After exposing isolated parts of plants to ethylene-air mixtures they observed ethylene responses in all parts of the treated plants. They found that the gas could enter through the epidermis of the stem, petiole, and leaf blade and subsequently travel in all directions in the plant. It was not determined whether the gas dissolved in the cell sap or moved as a gas in the intercellular spaces. The free movement of gas through the plant body may account in part for the symptoms which develop on the aerial parts of trees. Some of the foliar symptoms in particular may be due to the presence of gas in the leaves and may not be only the result of a root injury.

Harvey (6) studied the effects of ethylene on the metabolism of plants but shed no bright light on the problem of the physiology of gas injury. He reports that in ethylene-exposed plants the simple soluble substances increase at the expense of higher soluble and insoluble substances, that fats are much less abundant, that the osmotic pressure of the tissues is increased, and the permeability somewhat increased.

Despite the evidence produced by these and other workers implicating ethylene and its homologues as principal toxic constituents of manufactured gas, Hitchock, et al. (8) have stated that in certain experiments these compounds were not responsible for the highly toxic effects of gassed soil. They found that by scrubbing the gas with alkali hydroxide or silver nitrate, a process which removes hydrocyanic acid, the gas was rendered much less toxic. Not all of the toxicity was removed, however, even in the absence of HCN. Most of the manufactured gas today is scrubbed to remove most of the very poisonous hydrocyanic acid gas.

At least one worker has analyzed the effect of natural gas on the soil chemistry and characteristics. Schollenberger (10) found that the greatest chemical effect on the soil was a marked increase in the exchangeable manganese content. Also the amount of exchangeable ammonia increased appreciably. Consequently the hydrogen ion concentration was decreased giving a higher pH value for the gassed soil. These anomalies were attributed to a transient biological anaerobic reduction in the soil following the displacement of air by the gas. When the soil was aerated the exchangeable manganese quickly reverted to the non-exchangeable form.

At least part of the adverse effects of gassed soil around the roots of plants is due, undoubtedly, to the displacement of air by the gas. The resulting oxygen deficit in the roots would be injurious to itself and represents a mechanism of injury quite apart from the chemical toxicity of the gas. The close similarity of the symptoms of gas injury and those of root suffocation due to other causes lends further support to this hypothesis.

Loosened bark is easily stripped from some gas-killed trees. Maple died two months previously from gas injury.

Sorauer (11) theorized that because of an oxygen deficit in gas-filled soil the plant roots are forced to carry on intramolecular respiration which uses up the starch reserves in the roots. Intramolecular respiration in the aerial parts supposedly leads to the depletion of chlorophyll.

To summarize, it may be said that, in manufactured gas, ethylene and its higher homologues included as illuminants are capable of injuring vegetation but are not solely responsible for typical gas injury. Other constituents are injurious to a degree, and the physical displacement of air in the soil by the gas is in itself detrimental to plant life. Air displacement is certainly a prime factor where natural gas is involved since it contains little or no ethylene but is still toxic to plants, though to a lesser degree. The primary injury to plants by gas in the soil occurs in the root systems, although the gas may perhaps be transmitted through the plant and affect directly the aerial organs also.

For a more critical and inclusive review of this phase of the subject the writer is referred to the several papers cited, and particularly to the more recent one by Hitchcock, et al. (8).

III. *The Diagnosis of Gas Injury to Vegetation*

The diagnosis of gas injury to trees and other valuable plants can best be made during the growing season and while the symptoms are developing. Where trees are involved the diagnosis may be relatively simple or exceedingly difficult. The difficulties arise from the fact that the symptoms of gas injury are easily confused with those produced physiologically by compacted soil, waterlogged soil, water-deficient soil, nutritional defiiciencies, and salt injury; and with those produced by organisms such as vascular wilt diseases, anthracnoses, cankers and twig blights, root and trunk rots, borers, aphids, mites, and scale insects. Furthermore, the primary symptoms of gas injury are quickly obscured or complicated by invasions of saprophytic or weakly parasitic fungi and insects. Hence, it is a great advantage to examine a suspect-tree as early as possible.

In many cases of suspected gas injury to trees circumstantial evidence is the most reliable kind, i.e., evidence that toxic gas has been present immediately previous to, or concurrent with the sickening or dying of the trees. One looks for *signs* as well as *symptoms* of a plant disease. A *symptom* of the disease called "anthracnose of maples" is irregular brown areas of necrotic tissue in the leaves. A *sign* of the maple anthracnose disease is the presence of the fruiting bodies of the casual fungus on the affected leaves. Similarly, we should look for the signs of gas leaks which, together with distinguishable symptoms on the tree, constitute the evidence of gas injury.

A. *Signs of Gas Leaks:* The *smell* of gas would be a good sign of a gas leak in the vicinity, and in many instances it is possible to detect in the air the odor of gas escaping from the soil. (It has been observed that flies are attracted by gas leaking from the ground—a "tip" worth remembering). More often, however, the concentration of gas does not reach the threshold for detection in the air, so we must first *look* for leaking gas. In looking for gas leaks it should be remembered that perhaps 90 per cent of the leaks show up on grass and other small vegetation before any injury is apparent on trees.

To look for a gas leak we must know what the signs of a leak are. A leak in the main usually shows up as a roughly semi-circular area of dead or off-color grass on the side of the road nearest to the main. If the leak is a large one, or has been going on for a long enough time, an arc of the circle may appear on the opposite side of the road. Where

(Continued on Page 16)

PERSONALITIES IN ARBORICULTURE

No. 1: DR. P. P. PIRONE

By Edward A. Connell

We were humidly and uncomfortably draped in the upholstered heat of a Cleveland hotel room that sultry August night trying vainly to derive some small relief by sipping the innocuous near-beer peddled in the town named after Moses Cleaveland. We discussed the dismal tactical mistakes that Lou Boudreau and Kenny Keltner had made in the recent double-header (even though the Indians had managed to squeak through and win both games).

The conversation finally drifted around to the subject of scientists in general; arboricultural scientist in particular. It was unanimously agreed that, although all of us had been attending conferences of arborists for many years, we knew the scientific membership in but a cold and impersonal way—as readers of papers on phosphorus and phungi, as restrained researchers in tweed suits and subdued neckties.

Then the wit from New Jersey propounded the intriguing question—"if you didn't know that Pirone was a plant pathologist, what would you take him for the first time you saw him?"

The answers to this question were, to put it mildly, unique, and ranged from (a) an FBI operative to (z) a Buenos Aires rhumba band leader on a night off. On this high note of character analysis was born the resolve to do a series "one of these days" on "Personalities in Arboriculture."

The panel of aboreal-literary experts in the hotel room that night sipping the wilted beer, laid out a list of scientific personalities to be journalistically treated. The list was long enough, by the way, to fill considerable space in some unsuspecting periodical up to and including December, 1978. My collaborators solemnly promised their "utmost cooperation" that night as they skillfully handed me the ball. They have been in strange obscurity ever since except for the brief note that I received from one of them about two months ago posing the query: "I thought you were going to do the first one in Pirone?" I took the hint. I have checked, inquired, discussed, pried into the past, cut down, revised, and finished.

My first tangible factual nugget was that Pascal Pompey Pirone was born in Mount Vernon, N. Y., on October 7th, 1907, the second of the five children of Domenico and Mary Grace Pirone who came to the United States from Belizzi, Italy, about fifty years ago and settled in the Westchester County community.

Dr. P. P. Pirone, Plant Pathologist, New York Botanical Garden

The oldest of the five Pirone children is Joseph, a government employee, and part-time associate with his father in the wholesale grape marketing business. Matthew, Columbia Law School graduate, is a well-known Westchester County attorney and public speaking instructor in the Dale Carnegie Institute in New York City.

Pat's only sister, Rose, a Barnard College graduate, is married to Attorney Michael Civetta of the legal staff of the Metropolitan Life Insurance Company and the youngest of the quintet, Frank, an M.D., is a psychiatrist on the staff of Pilgrim State Hospital in Brentwood, Long Island, N. Y.

Following his early education at grammar school in Mount Vernon and graduation from A. B. Davis High School, Pat entered Cornell University in the fall of 1925, undecided on which of two careers to pursue—medicine, his mother's choice, or scientific agriculture, his father's selection. Facing the serious problem of pleasing both his father and mother, Pat carried out his first experiment in hybridizing—he decided to become a plant doctor, thus demonstrating at a rather tender age his ability to reconcile seeming contradictions and come up with a brand new solution which has become a part of his technique in the laboratory, classroom, and in the give-and-take of scientific discussion.

This rather psychic ability, points out one of Pat's friends, may also explain why PPP is but a trifle short of sensational in "reconciling" a difficult hand in poker, i.e., drawing to an inside straight!

Young Cornell freshman Pirone was greatly influenced in his eventual choice of a career by the late Professor H. H. Whetzel, pioneer plant pathologist. But once his decision was made and his academic duties were well-organized, Pat attended to other more vigorous matters than spores and cultures at the institution far above Cayuga's Waters with its waves of blue. He decided to make a spare-time activity of the old saying, "he who lives by the sword." He became one of Cornell's most-decorated minor sport athletes. He won the Eaton Trophy as the university's outstanding freshman fencer, was a member of Cornell's championship foils team in 1926, and in 1931 was a member of the foils team which won the Saltus Medal, emblematic of the National Junior Championship.

He captained the Cornell fencing team in his senior year and was awarded the varsity "C" for three years at the school where the late Gil Dobie, with more headlines than those grudgingly given to the fencing team, was fashioning the devastating off-tackle plays with Ramsay, Cassidy, Kaw, and Pfann pulverizing the grid opposition from Hanover to Princeton.

Pirone's first off-campus technical work was during the summer of 1926 when he worked as assistant plant pathologist for the A. A. Grinnell Company in Elba, N. Y. He was graduated in the fabulous year 1929, a year punctuated and emphasized by other noises in addition to the music and the speeches of the Cornell commencement celebration. One of the loudest noises of that year came in October when the bottom fell out of the stock market and Wall Street operators began to lose the debonair look.

The new Cornell alumnus was awarded the Nassau County Farm Bureau fellowship to work with vegetable growers on Long Island. He diligently continued his studies and research and was awarded the PhD at Ithaca in 1933. His doctoral dissertation, the first of many Pirone contributions to scientific knowledge, was "A Study of the Leaf Blight of Carrots Caused by *Macrosporium Carotas*, Ell. and Lang."

Pirone's post-bachelor (of science) days on Long Island working with the vegetable growers were devoted to some

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pursuits not strictly scientific such as his vigorous pursuit of the attractive Loretta Kelly of Hempstead. Differing little from those other objectives in Pat's well-planned operations, the treaty signalling "objective attained" was signed, sealed, and delivered in December, 1933, when Miss Kelly willingly submerged her ancient Gaelic name to become Mrs. P. P. Pirone. Now, in 1950, there are six—Mr. and Mrs., Tom, John, Mary Grace, and Joe.

From July 1, 1934, to June 30, 1936, Dr. Pirone held an appointment at Cornell as extension assistant professor of plant pathology and from July, 1936, to February, 1938, he was research assistant professor of plant pathology. He left Ithaca in 1938 to accept a position at the New Jersey Agricultural Experiment Station at New Brunswick where he remained until his appointment as plant pathologist at the New York Botanical Garden in July of 1947.

Although he is author or co-author of several hundred articles on diseases of vegetables, trees, shrubs, and flowers, Pat's most important contribution in the eyes of the arborist is his *Maintenance Of Shade and Ornamental Trees,* first published by Oxford Press in 1941 and reprinted in 1948. It is to this volume that the arborist looks as the lawyer looks to Blackstone and the medical man to Osler.

He is a contributor to the Rutgers University volume, *Grounds For Living,* and to Liberty Hyde Bailey's *Garden Of Pinks.* It should be pointed out, in passing, that the Bailey volume dealt with pinks of the genus *Dianthus* and was not included in the documentary material examined by the House un-American Activities Committee during the famous Hiss-Chambers tumult. The finding of the State Department microfilm in the pumpkin on Whittaker Chambers' Maryland farm does indicate, however, that plants can be very much involved in modern international doings.

Pirone is the co-discoverer of three new species of bacteria attacking ornamental plants and is the discoverer of several fungus diseases of trees. Because throughout his lifetime he has not only been intensely interested in medicine and medical research but has clearly seen the inter-relation of the biological sciences, Dr. Pirone's most dramatic "sideline" work is least familiar to those of us who have known him only as a plant scientist.

Since 1933, he has been applying himself unsparingly to the epidemiology of *Poliomyelitis* with the hope of some day helping to determine the reservoir of the polio virus. For the past several years he had worked closely with the late Dr. John A. Toomey, chief of the Division of Contagious Diseases in the Cleveland City Hospital and Professor of Pediatrics at Western Reserve University.

The first tangible result of the cooperative research in the polio field was a paper read by Dr. Pirone in 1948 at the Medical Section meeting of the American Association for the Advancement of Science in Boston. This paper, "Can *Drosophila* Flies Carry Poliomyelitis Virus?", credited to Drs. John A. Toomey, P. P. Pirone, W. S. Takacs, and Morris Schaeffer, appears in the *Journal of Infectious Diseases,* Vol. 81, No. 2. The paper represents purely exploratory initial work, of course. It is based on the facts that the spread of polio seemed to be synchronous with an increased consumption of fruits, particularly abundant during the summer season, and that the peak of the fruit flies coincides much more closely with the peak of polio than does that of other flies such as *Musca domestica,* the common house fly.

The objective of the initial scientific work was to determine whether this fly could easily carry fresh virulent polio virus either externally, in a mechanical way, or internally, and also whether the virus could multiply within the fly.

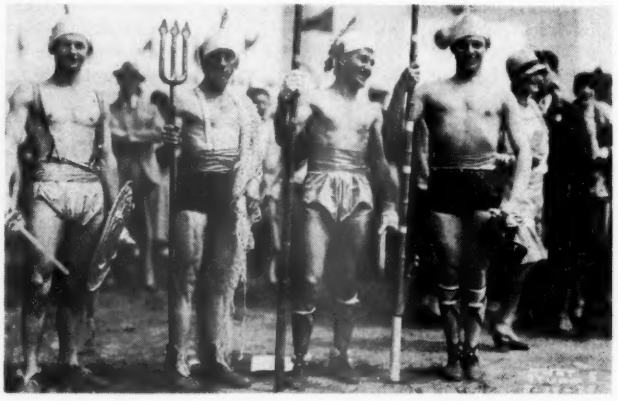
While the results of this work, as summarized in the "conclusion" of the paper read by Dr. Pirone in Boston, would indicate that fresh virulent virus does not seem to multiply in a strain of fruit flies and that these flies do not appear to be of epidemiological importance in poliomyelitis, the research will be continued in the general direction of determining, if possible, the as yet undetermined method by which the dread disease is transmitted.

What about Pirone, the non-scientist, the very human family man with the bubbling sense of humor? He is a sports enthusiast along with his boys and his favorite athlete is Jolting Joe DiMaggio. His favorite non-horticultural reading falls into two categories—medical history and detective stories. His favorite singer of songs is the crooner who for years has been struggling to get the blue of the skies to meet the gold of her hair. His favorite beverage is the amber, foaming liquid known in New England as "the tree man's cocktail"; known in Milwaukee as "the stuff" or "the meal ticket."

I asked Pat Pirone what he thought of the "conflict," so-called, between Science and Religion and he answered: "Each one of us would have more peace of soul and the world would be far better off if we thought as much of prayer as we do of science. What the world needs today far more than new and better ways of splitting the atom is more religion. Lack of religion is a greater menace to our civilization than a thousand atom bombs. What we are and what we accomplish are primarily dependent on what talents God has given us."

(Continued on Page 18)

Pat Pirone demonstrating correct fencing form as a Cornell athlete. Note the right angle position of the right leg, the continuous curve from chin to left foot. Pat is wearing a bullet-proof vest!



Pirone the Playboy! Hihgh Jinks at Cornell, "Spring Day," 1928. Our Pat is third from the left, the only one of the Roman Gladiators not looking at the camera. It is obvious why during this stage Pat was known to the girls as the "Handsome Latin from Manhattan."

A Promising Tree for American Horticulture

ALNUS CORDATA

This tree is the Italian Alder, a native of Italy and Corsica. It is a medium-sized, round-headed, hardy, deciduous tree, growing to some 30 or 40 feet in height, with handsome large glossy foliage somewhat resembling that of the pear tree and makes an excellent shade tree for parks or gardens and should also make a good street tree.

Unlike most species of Alder which thrive only in damp soil, the Italian Alder can be grown successfully in fairly dry situations and does well under highveld conditions. It is not particular as to soil and makes quite rapid growth if a fair amount of moisture is available. It is also a very suitable tree for planting on the banks of rivers or streams where it makes more rapid growth and attains a somewhat greater size than in drier locations.

If planted in wet sites the Alder gradually reduces the surplus water in the soil but, unlike the Eucalyptus which robs the soil of its nutriment as well as removing the moisture, it actually improves the soil by its heavy leaf fall and by its ability to fix atmospheric nitrogen in the nodules on its roots. It is also a useful tree for holding river banks against erosion.

The leaves of the Italian Alder are alternate, simple, finely-toothed, short-stalked, broad, heart-shaped at the base and abruptly pointed at the apex, from 2 to 4 inches long, dark glossy green above and light green beneath, sparingly pubescent beneath when young, glabrous when mature.

The flowers, which open in early spring before the leaves appear, are produced in separate male and female catkins which form towards the ends of the branchlets during the previous season and remain dormant during the winter. The male catkins are long and pendulous and are produced in such profusion that they are quite showy. The female catkins are short and develop into stalked woody cone-like fruits about an inch long growing upright, generally in threes, containing numerous small nut-like seeds which ripen in the autumn.

This tree is easily raised from seed which may be sown in autumn as soon as ripe or dried and sown in spring. It can also be propagated fairly well by cuttings of leafless shoots or by layering.

—*"Trees In South Africa."*

Editor's Note: The Italian Alder is hardy in Rehders Zone 5.

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PLANT AND SPRAY THE IRON AGE WAY

Trees...

NAA NEWS

By PAUL E. TILFORD, *Secretary*
Box 426, Wooster, Ohio

Line Clearance

"We seldom improve a shade tree by trimming it to give clearance for overhead wires but this has to be done, so we do the best we can." The arborist who made this statement was sincere and I am sure expressed the view of a majority of the companies doing line clearance.

In my opinion some of us have been too critical of line clearance. We have condemned most all of it, shouting that the trees were being ruined unnecessarily and that the men doing the work didn't know any better or just didn't give a "damn."

There is a lot of good line clearance which the most severe critics would find it hard to suggest how it could have been done better. Why not comment on some of the good jobs and do less harping on the poor ones? Some discussion and illustration of good work would be helpful and stimulating. One sure way of producing a bad boy is to continually tell the boy that he is bad.

A member of the National Arborist Association, who does line clearance, once said to me, if our severe critics would spend half as much effort in trying to help us by studying our problems and suggesting ways of improving our work as they do in just criticizing, they might do us some good. I have remembered that statement and believe there is truth in it.

Few of us realize the enormous size of the tree-overhead-line problem. There are near 150 million people in this country and a high percentage of them make some use of electric power or communication services which depend on electric power, supplied by overhead lines. Comparatively speaking, electric power is relatively cheap. It is cheap and widely available partly because it can be distributed on overhead lines. We expect and generally receive continuous, uninterrupted, 24-hour, year-round electric and communication service.

Our homes and places of business are located adjacent to streets and highways. In most instances the only practical place for the overhead wires which deliver cheap and continuous electric power to us is along these same streets and highways. We like our streets and highways decorated with trees, so there is a conflict. We are neither willing to give up the trees nor the cheap power and communication service. The only solution is a compromise. The lines should be placed so that there is the least possible conflict with trees and the trees must be trimmed to give necessary clearance for the wires.

The problem is an old one which has expanded greatly in the past few years. It will continue to expand in the future as more overhead lines are installed. It needs constructive study. Utilities don't place their lines along streets and highways in competition with trees purposely; in most cases there is no other practical place for them. Lines which carry heavy power loads cross-country usually are on special rights-of-way, not along highways. Many long distance telephone cables are underground and that practice is expanding. But the lines which bring the telephone and electric current into your house and mine will be overhead along our streets and highways for a long time to come and the wire-tree problem will continue.

In developing new sub-divisions much can be done to alleviate this problem by providing a place for overhead lines where they will not be in conflict with important trees. Also in new highway construction, if the right-of-way is thought of as a multipurpose right-of-way and provisions made for lines, which are sure to be there, much so-called "tree-butchery" in the future can be eliminated. Then, too, those of us who pride ourselves on being tree conscious should give more thought to spreading information on kinds of small trees which can be planted under or near overhead lines and will not grow up into the wires. These are a few approaches to the problem which should be, and to some extent are, given consideration in new developments. But these are of no help with the hundreds of millions of trees which now conflict with wires of present construction. With these trees it is either a case of removal or trimming to allow for clearance. Utility companies many times will gladly stand the expense of removing worthless trees, but very often the tree owner prefers to keep the tree even though it is headed back severely rather than have no tree. Then the arborist or tree service company is given the job of trimming to provide clearance for the lines and at the same time he is supposed to preserve the beauty and usefulness of the trees. In many instances this is impossible and he can only do his best.

These comments are in no way a defense of poor line clearance. I have tried to point out some of the difficult aspects of the problem and call attention to the fact that many of those who do line clearance would appreciate some constructive help.

* * * *

A Company Magazine and Picnic

Karl Kuemmerling, Inc., Forester to Public Utilities, of Canton, Ohio, has put out a magazine which he calls "Leaves" for his employees during the past several years. Some of the large tree companies have had employee magazines, but medium and small-sized companies have not generally undertaken it.

A cover with tree and leaf decorations in color is purchased by Karl. This cover is for 8½ x 11 letter-sized sheets. Copy for the magazine is mimeographed, assembled in the cover and stapled by the office force. Information of many types is included in the magazine, such as news from the different crews, location of crews, changes in personnel, safety information, company policy, tough jobs and how they were handled, good workmanship, etc.

The magazine makes for a closer knit organization. It increases the employee's respect and opinion of the company and it is a means through which Karl Kuemmerling can carry a message to each employee.

This same company also gives an annual picnic for its employees and their families each summer. Tom Neil does a good deal of the picnic leg-work. The following is a summary of the report of this year's picnic given by Neil at the National Arborist Association meeting in Syracuse last August.

A spot is selected where boating, bathing, baseball diamonds, picnic shelters and trees are available. Usually the company rents the resort for the day. The crowd assembles from all over Ohio in the forenoon and each family brings a picnic basket with plenty to spare for the single boys and girls. Ice cream and pop is on the Boss.

After dinner, and the one-hour rule is forgotten, the crowd goes in for about three hours of water sports. The only acceptable reason for not swimming is that you bathed before coming. Following the dunking, contests are held where the men can demonstrate their abilities and show the rest of the family how good they are and what they do at their work.

The tree-climbing contest comes first and when working for Karl Kuemmerling safety is always first, whether on the job or at a picnic. To date a serious accident has never occurred in any of

(Continued on Page 21)

Special Events Feature Midwest Tree Conference

Opening on Wednesday, February 14th in the LaSalle Hotel, Chicago, the Midwest Chapter of the National Shade Tree Conference will run for three days. Featuring this always good mid-winter meeting will be three special events.

First and most interesting should be the debate on the topic "Is Contract Work Advantageous to the Arborist." The negative side will be ably debated by that renowned juggler of words Vance I. Shield of Clayton, Mo.—and more often of Buschs Grove, also Missouri. His opponent remains unnamed and will probably be billed as the "Masked Marvel."

The second special will be a "Stump the Plant Experts" question box with Dr. Paul E. Tilford as moderator. Six weeks prior to the meeting cards will be sent out inviting people to submit answerable questions on arboriculture. Prizes will be offered by several dealers in arborist supplies.

There will be the usual "Question Box" and questions will be referred to the Plant Clinic. The annual banquet will be held Thursday evening with dancing and entertainment to follow. A special day will be reserved for the ladies.

The incomplete program follows:

Wednesday, Feb. 14, 1951

"Mosquito and Fly Control with Chemicals."
Thomas J. Lynch, Sanitary Engineer, North Shore Mosquito Abatement District, Northfield, Illinois.

"The Arborists' Job."
Harlow B. Mills, Chief, Illinois Natural History Survey Division, Urbana, Illinois.

"Turf Management in Tree Areas."
William H. Daniel, Head, Turf Research and Extension Department, Purdue University, Lafayette, Indiana.

Debate: "Is Contract Work Advantageous to the Arborist?"
Affirmative—Speaker to be announced.
Negative: Vance I. Shield, Shield Shade Tree Specialists, Clayton, Missouri.

"Gas Injury to Trees."
Speaker to be announced.

"Developments in Oak Wilt Research."
James E. Kuntz, Assistant Professor, Division of Forest Pathology, University of Wisconsin, Madison, Wisconsin.

"Some Aspects of the Use of 2, 4-D in Arboriculture."
B. H. Grigsby, Associate Professor and Research Associate, Dept. of Botany and Plant Pathology, Michigan State College, East Lansing, Mich.

"Stump the Plant Experts."
Panel: Arborist—Larry Wachtel, Wachtel Tree Science and Service Company, 611 Maywood Avenue, Wauwatosa, Wisconsin.
Pathologist—Forrest C. Strong, Assistant Professor, Dept. of Botany and Plant Pathology, Michigan State College, East Lansing, Michigan.
Botanist—August P. Beilmann, Manager, Missouri Botanical Garden, The Arboretum, Gray Summit, Missouri.
Entomogologist—To be announced.
Moderator—Paul E. Tilford, Executive Secretary, National Arborist Association, Inc., Box 426, Wooster, Ohio.

"Price Control Factors."
Speaker to be announced.

"Scale Insects and Control Measures."
Speaker to be announced.

"Fruit Tree Maintenance."
Speaker to be announced.

"Small Trees for Street and Home Planting." Illustrated with 3rd dimension slides.
Edward H. Scanlon, Commissioner, Division of Shade Trees, Cleveland, Ohio.

"Dutch Elm Disease and Control Methods."
Roger U. Swingle, Senior Pathologist, U.S.D.A. Bureau of Plant Industry, Division of Forest Pathology, Columbus 7, Ohio.

"Miracle of the Trees." (A color film with sound track, and time-lapse photography and lecture).
John Nash Ott, Jr., John Ott Film Library, Inc., 730 Elm Street, Winnetka, Illinois.

"Plant Clinic."
Panel to be announced.

Session Chairmen: Fred Wagner, Wagner tree Surgery Company, McPherson, Kansas.
Harold Glissman, Supt. of Grounds, Father Flanagan's Boys Home, Boys Town, Nebraska.
L. R. Tehon, Head, Section of Applied Botany and Plant Pathology, Illinois Natural History Survey, Urbana, Ill.
Frank Hanbury, Hanbury Tree Expert Company, 308 No. Elmwood, Peoria, Illinois.
George W. Kelly, Horticulturist, Colorado Forestry and Horticulture Association, Denver, Colorado.

Toastmaster at the banquet: Karl Dressel, Associate Professor, Department of Forestry, Michigan State College, East Lansing, Michigan.

Members of the Committee on Arrangments:
Alfred F. Carlstrom, Chairman, Chicago Park District, Chicago, Ill.
George Caskey, Supt. of Parks, Winnetka, Illinois.
Marvin Stevens, Arborist, 77 Park Drive, Glenview, Illinois.
Harry A. Morrison, Arborist, 208 Wood Court, Wilmette, Illinois.
Frank J. Prem, Arborist, 6656 No. Oconto Avenue, Chicago, Ill.
Gordon B. Wallace, Supt. of Parks, Wilmette, Illinois.
Mrs. Zilpha Thompson, Winnetka, Illinois, in charge of Ladies Program.

Strangled Trees Breed Seed

Tree strangelrs are working in western Washington forests to help Nature reforest harvested lands.

The timber garroters are Weyerhaeuser Timber Company foresters whose aim is to boost cone and seed output of selected Douglas fir trees. Quantity and quality of this annual crop determines how soon a logged area will bristle with a green carpet of baby fir seedlings. Nature replants over 90 per cent of the forest land in the northwest, and loggers and foresters are anxious to help her.

"The idea came partly from mountain beavers, bears and cats," state Weyerhaeuser's research foresters. "Horticulturists have used the system on orchard trees as early as 1800. So far as is known, it was first tried on forest trees by Swedish foresters in 1938. Our own experiment, started in April of this year, isn't far enough along to report any finding."

"Distress seeding," is supposed to do two things. It stimulates seed and cone production of parent trees specially selected for their form and growth qualities, so that the new tree crop will be of superior quality. Forced seeding also produces more cones on trees in areas poorly stocked with reproduction and thus thickens up the stand.

The theory behind the experiment is simple. A tree pumps up nutrients and water through the center of its stem and converts them into food, which it sends back down to the tree's living parts through the cambium layer inside the bark. Tree farmers have long observed that physical damage occurring to this inner bark layer, through partial girdling or clawing and chewing by bears, mountain beavers or cats, makes the tree think it's dying. Its reaction is a last-gasp effort to procreate its kind by putting stimulated energy into seed production.

Capitalizing on this botanical fact, Weyerhaeuser foresters have tightly strapped about 100 trees with narrow steel bands placed approximately 4½ feet above ground, one hand per tree. The "guinea-pig" trees, mostly from 15 to 25 years old, are located on three of the company's tree farms in Washington. Annual diameter expansion of the fast-growing trees will increase the pressure of the bands, causing restriction of food flow and scaring the trees into thinking their days are numbered.

The "strangling" bands will be removed after about two years. The scare effect on the tree's growth mechanism is expected to linger another 5 or 7 years after the liberation. Result: more tree seed spread over acres of forest land.

Above left—McCulloch Chain Saw converted to handle a six-inch earth drill.

Above right—The old reliable Disston 12 h.p. chain saw gets an assist from beautiful Ethel Casey, radio singer.

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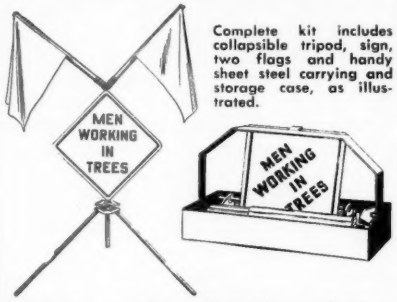

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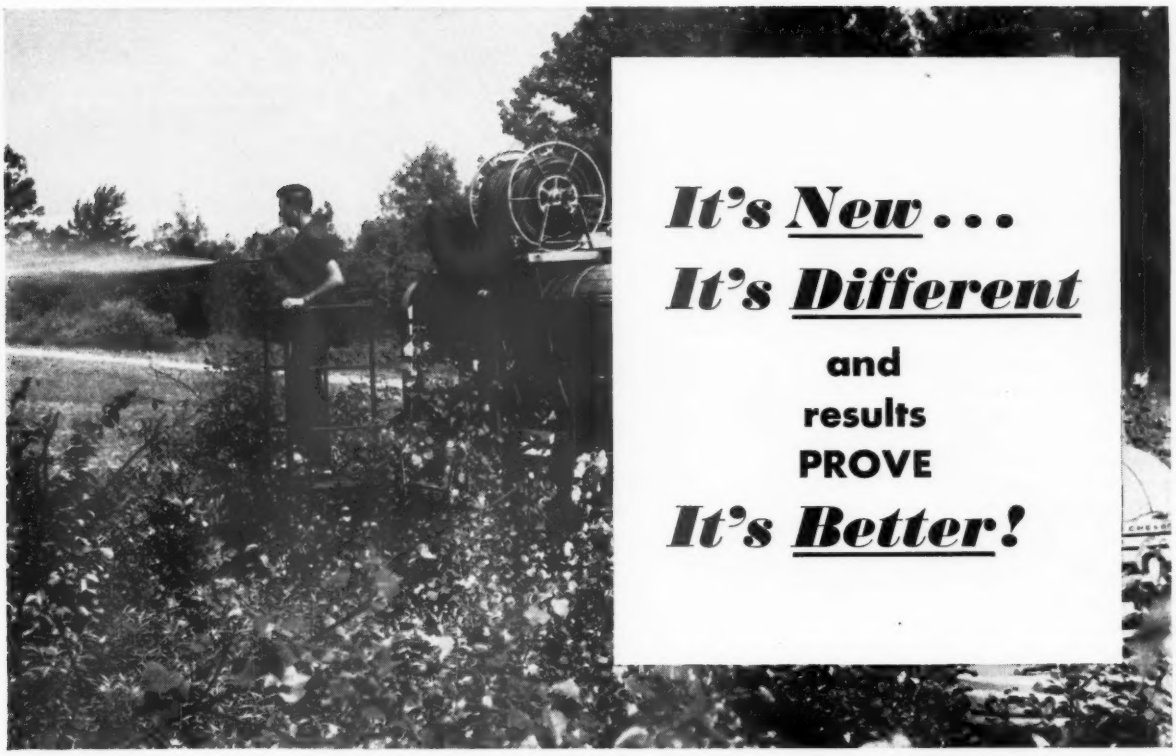

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GAS INJURY

(Continued from Page 8)

leaks of long standing are involved there may be no vegetation left in the gassed area.

If the leak is directly under a grass plot, as in a service under a lawn for instance, the area of dead or off-color grass will be circular in outline. Gas injured grass is orange-brown in color with a burnt, moth-eaten appearance. The injury is most severe at the center and grades off into the healthy grass at the periphery.

Hedges are stunted and scorched, or areas may be killed outright, by leaking gas. The same arc of injury is apparent, this time projected onto a vertical plane. Injured coniferous hedges become burnt orange in color. Privet hedges appear to be quite resistant to gas injury.

Vegetables and flowering plants are stunted or killed by gas; the leaves and flower petals are blighted as if by frost. Ferns, mosses, and liverworts are highly resistant generally.

In congested city areas there may be no small vegetation other than the ubiquitous weeds which spring up along the curbs, in cracks in the sidewalks, between the curb and the road, and at the bases of poles and hydrants. The absence of weeds in such places, or the presence of scorched and stunted weeds, may be a sign of a gas leak.

In the absence of any small vegetation, or any injured small vegetation, one should next proceed to smelling for gas in curb-boxes, drip boxes, catch basins, and telephone and electric light conduits. A more dependable procedure is to make "bar holes" in the ground at several points within the suspected area and smell for gas in those. The holes should be at least 10-12 inches deep and should be sniffed immediately. Frequently it is possible to detect gas by smelling the roots of deep-rooted weeds and grasses.

It sometimes happens that tree roots are being exposed to a pocket of gas confined under the pavement near the main. Therefore, if one cannot detect the smell of gas in bar holes made through unpaved surfaces, and the possibility of a gas leak is still suspected, one should request the gas company to drill through the pavement at several points over the main. Most gas companies have gas detecting instruments which are more sensitive to the presence of gas than is the human sense of smell. (Humans can smell part gas in 400 parts of air, chemical tests can detect 1 part in 10,000 parts air, certain plants will respond visibly to 1 part in 500,000 parts air. Electrically operated instruments in common use are sensitive

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enough to register the combustible gases in cigarette smoke). Such an instrument may be used to advantage in detecting small leaks or distant leaks. Moreover, these instruments may usually be fitted with a filter which screens out hydrocarbons such as gasoline and fuel oil, thus eliminating the possibility of confusing injury resulting from these materials with those caused by illuminating gas.

At no time should anyone attempt to light the gas by dropping lighted matches into bar holes, valve boxes, or manholes—serious consequences may be suffered.

When "delayed diagnoses" are being made on sick or dead trees it is, of course, more difficult to find circumstantial evidence which points to leaking gas as the cause. In such cases one may look for repair patches in the street which might indicate that a leaking pipe had been repaired recently. Also one may smell for "sour-gas" in the soil; in heavy soils the gas lingers for fairly long periods and eventually becomes distinctly sour-smelling and disagreeable. One should keep in mind that a repaired leak may still be leaking, or a previously undetected leak may be involved. It is wise to keep an eye on repaired leak locations for the return of grass and weeds to the affected area.

B. *Symptoms of Gas Injury on Trees:* As has been said above, the symptoms of gas injury on trees may easily be confused with symptoms resulting from other troubles and diseases. During an examination one should try systematically to consider and eliminate other agents which might be causing the injury. Also, the role of other agents in contributing to the injury, or in predisposing the tree to gas injury, is an important aspect to be considered.

Certain trees are more sensitive than others to gas in the soil. Among the more susceptible trees are apple, pear, American ash, elm, alder, Catalpa, poplar, linden, and maples (5). Box elder is said to be very resistant. Conifers in general are quite resistant.

1. *Symptoms on the foliage*—The most obvious symptoms of gas injury to trees, and the first symptoms during the growing season, appear on the foliage. The leaves over most of the tree may be affected, or, more frequently, the affected leaves are confined to the leader terminal or to one or more side branches. The foliar symptoms vary in intensity from an off-color light green or chlorotic mottling where small leaks of long standing are implicated, to a distinct browning, curling, and death of the leaves where more serious leaks are involved.

(This article to be concluded in next issue)

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PIRONE

(Continued from Page 10)

Now the success of science has given rise to the widespread belief that scientific knowledge is the *only* kind of knowledge existing and that knowledge is impossible outside the fields which science can deal with—if, indeed, there is anything outside these fields, adds the materialist. This scientific fallacy is one of the major characteristics of modern thought and one of the primary threats to our traditional values.

This is the narrow fallacy that was alien to the deep spiritual convictions of the great natural scientists I have known and respected—men like Dr. E. Porter Felt, Dr. George Clinton, Dr. Britton, Dr. George E. Stone, and a host of others. This is the narrow fallacy alien to the workable and shining philosophy of Pat Pirone whose outlook is more than superficially reminiscent of Chesterton's definition of "mysticism"—"its whole secret is this; that man can understand everything by the help of what he does not understand."

As Pat Pirone recognizes acutely the thorough-going harmony between the spiritual and the scientific, he also recognizes the value of common sense and the dependence of scientists on others in research and in living. His remark concerning his wife is indicative of this recognition—"without the constant advice and encouragement of Loretta, the few contributions I have made would not have been possible. The Lord has blessed her with qualities far superior to those that can be acquired from books and she has more common sense than a whole university of scientists like me."

Has Pirone's new research caused any loss of interest in the arborist and his problems? Emphatically not. We talked about trees and the arborist. I asked Pat to name his favorite tree expecting, of course, a vote for the dramatic American Elm or Norway Maple or Sycamore of his native Mount Vernon. He cast one enthusiastic ballot for Sweet Gum, *Liquidambar stryaciflua,* and it is interesting to note that Apgar's partial description of the tree includes "star-shaped leaves, smooth and shining; well worthy of more extensive cultivation." A philosopher of the Symbolist school could build a Pirone study around these cryptic allusions.

He summed up his "practical advice to the arborist" in a few words. "The arborist must always keep in mind the fact that a satisfied client is the only kind that will insure continued business. One 'quack' or 'fly-by-night' in a community can undo the good-will that it took ten years for the ethical operators to create and build."

On the subject of tree research: "Arboriculture can progress" he said "only as fast as research progresses." As a footnote, he added: "More money must be spent in arboricultural research all along the line. I wish that we could make people understand that we've only begun to scratch the surface."

Pirone is but one of an army of unsung heroes in non-medical research whose contributions to human welfare are too little known. They are the entomologists and botanists and pathologists and agronomists in universities and agricultural experiment stations from Maine to California. *Streptomycin* and Dr. Selman Waksman of New Brunswick, the anti-biotics and Drs. Duggar, Ehrlich, and Burkholder, the tremendous contributions of Dr. E. C. Stakman of the University of Minnesota and a hundred other research discoveries and research scientists non-dramatically and obscurely seeking out the secrets that will help solve the many unsolved riddles of human well-being, these, fellow-horticulturists, are *our* scientific contributions and these are *our* scientists.

Pat Pirone is but another human chapter in the Saga of America where immigrant parents of character, determination, humility, and faith in God and in their fellow-Americans can live to see in their lifetime the realization of the dream they held in the old country.

And it is this dream through the years that has drawn to New York and Kansas and California and Minnesota the Latin, the Slav, the Celt, the Scandinavian, to make of the dream of opportunity and equality and freedom a living and vital reality.

I will conclude my assignment in a slightly unorthodox fashion by moving Pat Pirone out of the picture. I will raise a thin goblet of shining Chianti wine and drink to Domenico and Mary Grace Pirone who came to Mount Vernon nearly fifty years ago—*saluta!*

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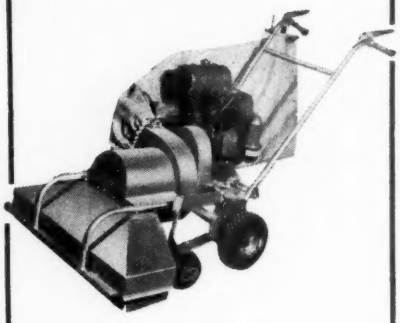

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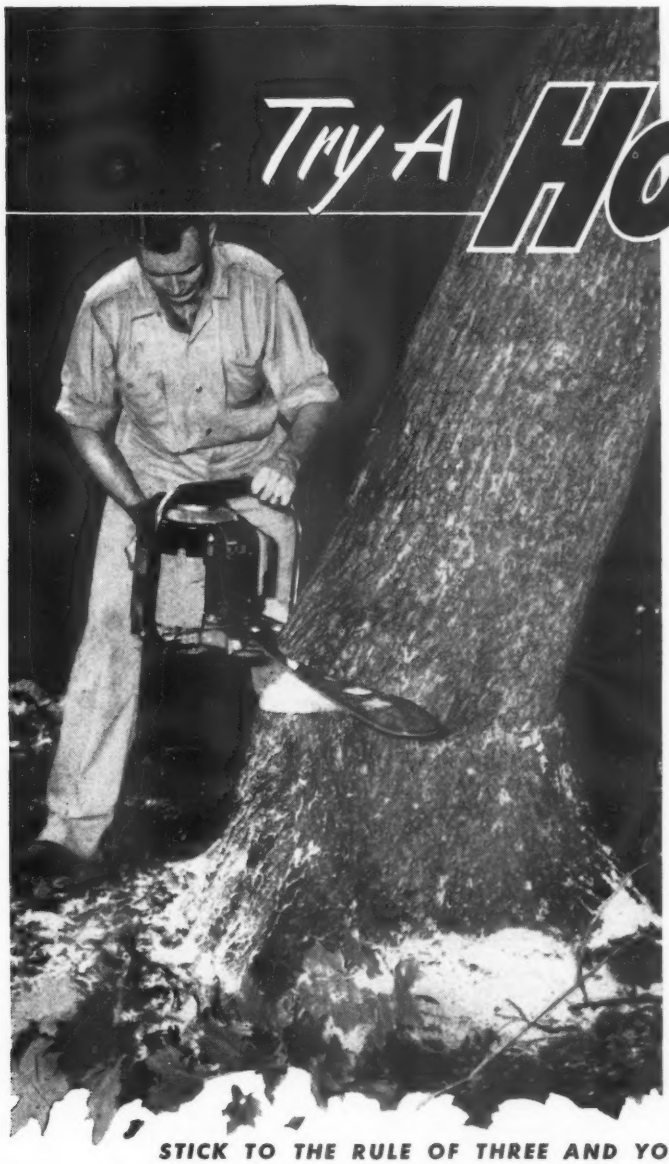

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GEORGE BLAIR ON UTILITY EDITORIAL

Dear Mr. Scanlon:

As a long-time subscriber to your magazine, TREES, I have noted with genuine interest the high quality of published material therein appearing over the years. There is evidence in many places that your personal unstinted efforts have been a mighty contribution to the better understanding of shade trees by the public, arboriculturists, and others. In my opinion, based upon a background of 28 years continuous experience dealing with shade trees and general forestry programs, your personal touch, sprinkled with good humor, also fairness and a good sense of balance, has made TREES magazine a highly respected and useful publication.

In offering you, as editor of TREES, these comments, I would like to use the occasion also to discuss my reaction to your editorial "Out on a Limb—Utilities Conduct Death March on Trees" appearing in the September-October, 1950 edition. From a careful examination and rereading of this editorial referred to, I feel that a local example has been represented as a generally bad nationwide condition. Undoubtedly there are some bad tree and wire relationship spots around the country just as there are some poorly administered municipal shade tree programs, however, to convey the impression to the readers of TREES that the Clifton Boulevard, Lakewood, Ohio case is nationwide, is like saying one rotten apple in a bushel makes its entire contents unfit for use. The selection of such words and terms as "death march on trees," "avaricious stringing of wires," "trees were butchered to fit," "horrible monstrosities," "barbarous destruction," must in your judgment apply only to the Lakewood case, as the trust and responsibility reposed in editorial writing for trade and technical magazines does not ethically permit the use of such degrading appellations to a broad national situation unless, of course, a searching nationwide survey has been made to collect documented evidence to support the contention.

I am not speaking for the electric company with which I am associated, nor for the electric public utility industry, even though for some years, I was chairman of the Edison Electric Institute Tree Clearance Committee, which prepared, published, and distributed to member companies, the pamphlet entitled, "Line Clearing Manual for Overhead Electric Conductors," a few years ago. A copy of this manual is herewith attached and I believe upon reading same, you will find fair, balanced, approaches and recommended procedures, such as pre-planning, design, engineering and construction *to intelligently meet tree and wire problems.*

Even though I am sure many industrious, honest, sincere tree men will resent, as I do, your editorial implications repleate with photographs, Ed, I am writing this letter entirely for two purposes, first to state that I do not believe you intended to indict the electric utility companies throughout the nation, second to appeal to your personal high sense of fairness and balance to correct the impressions conveyed by the September-October, 1950 issue of TREES, namely that all electric utility companies are arrogantly destroying or butchering trees. If you wish, this letter in its entirety may be used for that purpose. Also I believe there will be no difficulty in securing approval from the Edison Electric Institute to use any or all of the contents of the enclosed manual.

Sincere friendly regards,

G. D. Blair, *Forester,*
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NAA NEWS

(Continued from Page 12)

the contests. Before the contest a tree is selected with two good crotches, one about 35 feet and one 40 feet off the ground. A climbing rope has been threaded through the highest crotch with both ends resting on the ground and a safety saddle attached to one end. At a given signal the contestant pulls himself, using his legs as well as his arms if he wishes, to the first crotch. There he ties his sliding knot and returns to the ground as quickly as possible, being timed by a stop watch from the instant he is told to start until his feet touch the ground again. The winner this year was Joe Kocker who made the trip up and down in twenty-five seconds.

Next comes the rope-throwing contest. Three crotches are selected to pitch to with the highest being 35 feet. Each contestant must throw for the lower crotch, then the second and last the highest crotch. Then each one is given a choice as to which one he wishes to throw for. One point is given for the lowest crotch, two for the middle, and three for the highest. Dick Powell won the event this year with a total of seven points.

Kratzer and Nelson, the Kuemmerling cross-cut team, won the cross-cut contest again this year. Paul Nelson also repeated again by cutting through a 14-inch pole with a hand saw in 34 seconds. Stanley Kratzer chopped his way through an 8-inch pole in eighteen seconds to win the last event at this year's picnic.

Paul Nelson, because of his efforts and skill, won the grand prize—a trip to the Syracuse Convention of the National Shade Tree Conference with all expenses paid.

These picnics cost the company money, require a lot of planning and last only one day but the goodwill, friendships and personal enjoyment more than offset the cost, according to Karl Kuemmerling and he is the fellow who pays the bills.

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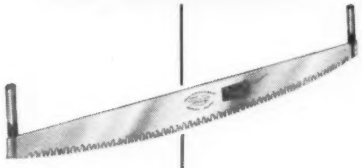

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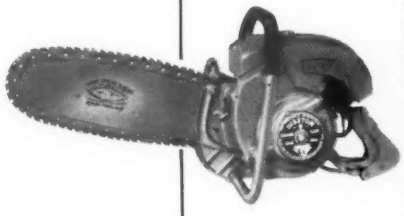

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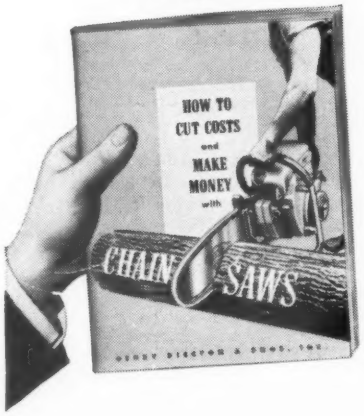

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Authors and Books

The following books may be ordered from TREES Magazine, Box 5607, Cleveland, Ohio.

THE PLANT DOCTOR, by Cynthia Westcott (Third Edition). J. B. Lippencott Co., New York. 231 pgs., illus. $3.00.

This is a complete and thoroughgoing revision of a book that practically guarantees you a reasonably healthy and well-groomed garden. It gives the how, when and why of insect and disease control in your garden, and its advice and information have been considered so authoritative that the book is on the required reading list for the Flower Show Schools of the National Council of State Garden Clubs. The control measures recommended are practical, expert, economical and time-saving—only an hour's work per week being required.

Detailed and definite instructions are given for combating all of the common garden enemies. The principles of, and reasons for, various cures and preventives are made apparent. Most important, the plan follows a seasonal and climatic schedule, the exact *when* of spraying and dusting being the essential factor. Hence the book is presented in the form of a calendar, beginning in February. The discussion in each case begins with the symptoms of trouble, and the remedies prescribed are based on many years of practical experience and comparative methods on the part of the author.

All pests and ailments which it is unusual *not* to find in any garden are thoroughly discussed: bacterial, fungus and virus diseases, physical injuries and those caused by environment and by chewing and sucking insects, nematodes and mites. A complete dictionary is added for reference, giving definitions, host plants, diseases, apparatus and other topics, a section much expanded in this edition to include all the new fungicides and insecticides.

This is the only popular book of its kind by an authority whose daily job is precisely that of caring for private gardens. Dr. Westcott was for ten years on the staff of the Plant Pathology Department at Cornell, and has been a practicing plant physician for seventeen years, numbering among her patients some of the finest gardens in the Northeastern States.

The calendar given as the schedule for operations is for the vicinity of New York City, and is also serviceable farther north or south with the usual allowance of a week's difference for each hundred miles of latitude. Special regional problems are discussed in separate chapters on the Middle West, Southeast, Southwest, and California, and there is a new chapter on the problems of the Northwest.

* * * *

CONSERVATION OF NATURAL RESOURCES. Edited by Guy-Harold Smith. John Wiley & Sons Inc., New York-London. 552 pgs., illus. $6.00.

The Development of Conservation in America. The Public Domain and Its Disposal. The Great Soil Groups and Their Utilization. Soil Conservation. Tree Crops. American Irrigation. Grassland Resources. Reclamation of Wet and Overflow Lands. The Agricultural Prospect. Our Forest Resources. The Practice of Forest Conservation. Water Supply for Domestic and Industrial Uses. Water Power and Its Conservation. Our Waterways and Their Utilization. Floods and Flood Control. Conservation in the Mineral Kingdom. The Mineral Fuels. Conservation of Wildlife. Fisheries for the Future. Recreational Resources. The Conservation of Man. State and Local Planning. National Planning and the Conservation of Resources.

Conservation of Natural Resources is able to cover all natural resources comprehensively because it is the combined work of 20 authorities. Each of them has written about the phase of conservation or the natural resource he knows particularly well. Their work was then integrated and edited by Dr. Guy-Harold Smith of The Ohio State University.

Conservation of Natural Resources is based on the highly-regarded second edition of Parkins and Whitaker's *Our Natural Resources and Their Conservation*. It has been completely rewritten, and many new authors have contributed to *Conservation of Natural Resources*.

After two chapters of background information, *Conservation of Natural Resources* deals with each resource in turn. The contributors present the pertinent geographic and conservation data about each resource, including:

Its extent and distribution . . .

The use to which it has been put in regional and national development . . .

The natural and human factors which have made themselves felt in this generation . . .

The conservation practices which seem promising.

To illustrate the thoroughness with which *Conservation of Natural Resources* covers its field, here is a brief summary of just one chapter, *The Great Soil Groups and Their Utilization*: First Professor Wolfanger divides soils into two great classes: *Pedocals* and *Pedalfers*. He contrasts them as to formation, composition, occurrence, physical construction, usefulness, etc. Then he points out how the climate and vegetation of different regions have affected these two main soil types so that they can be further subdivided into what are commonly called "the great soil groups."

* * * *

TREE TRAILS AND HOBBIES, by Ruth Cooley Cater. Doubleday and Company, Inc. Garden City, N. Y. 324 pgs., illus. $3.50.

A NARRATIVE REVIEW of the trees of America opens this unusual book. Complete description is given of the nature and characteristics of each with correct methods of identification, range, and habitat. There are clear and simple explanations of the differences between the various Oaks, the numerous Pines, etc.

ALL TREES BEAR FLOWERS and the section devoted to tree flowers is absorbing. Here is a revelation of the amazing variety of unusual flowers from those of the Incense Cedar which appear in midwinter to those of the Magnolia that measure a foot across. Nature's devices for assuring pollination are delightfully described.

FRUIT OF THE TREES is another fascinating chapter. You will be surprised at the astonishing variety of form in the acorns and in the cones of the evergreens. The seeds also are a part of this interesting story together with their methods of germination and the first stages of growth. You will marvel at the birth of a Giant Sequoia from a tiny eight-inch seed.

LEAVES AND BUDS are covered with descriptions of their exquisite anatomy, their functions and how they perform. You discover the nature of outer bark, inner bark, cambium, sapwood, heartwood; the way grain, knots, and bird's-eyes are created.

AND MANY MORE AMAZING STORIES of curious forms and oddities to be found among the trees; of their life through the four seasons of the year; of their interesting names and why they got them; of the riches of all kinds that they offer us. Here, too, are trips to enthralling places in the tree world—the magnificent Sequoia Forest, Arizona's eerie Saguaro Forest, the Nutmeg trees in Yosemite, the world-famous Torrey Pines, and others equally delightful.

* * * *

PRINCIPLES OF SILVICULTURE, by Frederick S. Baker. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York., 414 pgs., illus. $5.00.

Principles of Silviculture is a straightforward exposition of the fundamental biological facts and principles that underlie the management of forests. The first five chapters outline the various forms and types of forests and the trees of which they are composed. This discussion pulls into focus the diversity of conditions which are encountered. Chapters VI to IX discuss the basic physiological reactions of trees to water, light, nutrients, etc. The remainder of the book outlines the growth and development of the forest from seed to maturity.

The text is distinguished by its simple approach to the problems underlying the practice of silviculture, coupled with a wealth of concrete illustrations of the various points which are covered, involving the use of a large number of graphs, tables, and other numerical data. All material is completely up to date.

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Another Timesaving Asplundh Chipper

Oakland, Calif., Park Department Puts Asplundh Chipper in Service

DATA ON BRUSH CHIPPING UNIT

This chipping unit was fabricated using a basic Asplundh Chipper.

A Chrysler Industrial Engine, available from War Surplus at no cost to this department, was used for power. The Chipper runs at a speed of 3000 R.P.M. and is capable of chipping up branches to 6 inches in diameter. However, its most effective use is for brush and small limbs up to 2 inches in diameter.

The 2½-ton 1942 GMC truck was purchased from War Surplus for $1200.00, reconditioned at the Corporation Yard and equipped with a twin hydraulic hoist. This truck, together with the Chipper, forms the complete unit which will be used in the Street Tree operations of the department. The chipped-up brush will be composted for humus.

By using this equipment it will be possible to save considerable operating time which is now spent in hauling brush from the job to the burning site beyond the Alameda Golf course, as well as providing the department with valuable humus.

The total cost of the complete unit was approximately $2800.00. If purchased new it would cost in excess of $6000.00.

This is the first unit of its kind on the Pacific Coast. However, many private tree surgery companies, large orchardists and other municipalities will, we are quite sure, see the value of this Chipper and install similar equipment in their operations.

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